

PATENT CLAIMS

1. Composition for preparing poly(meth)acrylimides
and for producing poly(meth)acrylimide foams,
5 according to Figure 5,

characterized in that

10 methacrylic anhydride and one, or two or more different, N-methacrylamides [sic] $C_4H_6NOR^1$ according to Figure 6, and/or one, or two or more different, primary amines H_2NR^1 was added to the composition, where R^1 or R^2 [sic] may be identical or different and are an alkyl or aryl radical
15 which has up to 36 carbon atoms and in which oxygen atoms, nitrogen atoms, sulphur atoms, and phosphorus atoms in the form of organic functionalities, e.g. an ether function, alcohol function, acid function, ester function, amide function, imide function, phosphonic acid function, phosphonic ester, phosphinic acid function, phosphinic ester function, sulphonic acid function, sulphonic ester function, sulphinic acid function, sulphinic ester function, silicon atoms, aluminium atoms and boron atoms, or else halogens, such as fluorine, chlorine, bromine or iodine may also be present, R^1 and R^2 may be the methyl group, the ethyl group, the n-propyl group, 2-propyl group, n-butyl group, 2-butyl group,
20 3-methyl-2-butyl group, tert-butyl group, the isomers of the propyl, hexyl, heptyl group, the isomers of the octyl group, e.g. the 2-ethylhexyl group, the lauryl group, stearyl group, the phenyl group, benzyl group, alkylphenyl group, alkylbenzyl group, $R^3-PO(OR^3)_2$ group, where R^3 is an alkyl or aryl radical having up to 20 carbon atoms.
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2. Composition according to Claim 1, characterized in

that the composition comprises a blowing agent which is preferably an aliphatic alcohol having from 3 to 8 carbon atoms, urea, monomethyl- and/or N,N'-dimethylurea and/or formamide and/or water.

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3. Process for producing a polymethacrylimide foam, characterized in that a mixture composed of

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(A) from 0.7 to 1.3 molar parts of one or more primary amines H_2NR^1 , where R^1 is as described above,

from 0.7 to 1.3 molar parts of methacrylic anhydride;

(B) from 0.3 to 2.0 molar parts of methacrylonitrile,

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from 0.7 to 2.5 molar parts of methacrylic acid and

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from 0 to 0.2 molar part of other monomers having vinyl unsaturation, where the ratio of the total of the molar parts of (B) and (A) is $(B)/(A) =$ from 0 to 1 million;

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(C) from 0.5 to 15 per cent by weight, based on the total of the weights of components (A) and (B), of a blowing agent;

(D) from 0.01 to 0.5 per cent by weight, based on the total of the weights of components (A) and (B), of one or more polymerization initiators;

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(E) from 0 to 200 per cent by weight, based on the total of the weights of components (A) and (B), of conventional additives

is polymerized to give a sheet, and then this polymer sheet is foamed at temperatures of from 150 to 250°C.

4. Process for producing a polymethacrylimide foam, characterized in that a mixture composed of

5 (A) from 0.7 to 1.3 molar parts of one or more primary amines H_2NR^1 , where R^1 is as described above,

from 1.4 to 2.6 molar parts of methacrylic anhydride,

10 from 1.4 to 2.6 molar parts of methacrylonitrile;

(B) from 0.3 to 2.0 molar parts of methacrylonitrile,

from 0.7 to 2.5 molar parts of methacrylic acid and

15 from 0 to 0.2 molar part of other monomers having vinyl unsaturation, where the ratio of the total of the molar parts of (B) and (A) is $(B)/(A) =$ from 0 to 1 million;

20 (C) from 0.5 to 15 per cent by weight, based on the total of the weights of components (A) and (B), of a blowing agent;

25 (D) from 0.01 to 0.5 per cent by weight, based on the total of the weights of components (A) and (B), of one or more polymerization initiators;

(E) from 0 to 200 per cent by weight, based on the total of the weights of components (A) and (B), of conventional additives

30 is polymerized to give a sheet, and then this polymer sheet is foamed at temperatures of from 150 to 250°C.

5. Process for producing a polymethacrylimide foam, characterized in that a mixture composed of

(A) from 10^{-7} to 1.3 molar parts of one or more N-methacrylamides [sic] $C_4H_6NOR^1$ according to Figure 6, where R^1 is as described above,

from 0.7 to 1.3 molar parts of methacrylic anhydride,

10 from 10^{-7} to 1.3 molar parts of methacrylonitrile, where the total of the molar parts of methacrylonitrile and of the N-methacrylamide is from 0.7 to 1.3 molar parts;

15 (B) from 0 to 0.2 molar part of other monomers having vinyl unsaturation, where the ratio of the total of the molar parts of (B) and (A) is $(B)/(A) =$ from 0 to 1 million;

20 (C) from 0.5 to 15 per cent by weight, based on the total of the weights of components (A) and (B), of a blowing agent;

(D) from 0.01 to 0.5 per cent by weight, based on the total of the weights of components (A) and (B), of one or more polymerization initiators;

25 (E) from 0 to 200 per cent by weight, based on the total of the weights of components (A) and (B), of conventional additives

30 is polymerized to give a sheet, and then this polymer sheet is foamed at temperatures of from 150 to 250°C.

6. Process for producing a polymethacrylimide foam, characterized in that a mixture composed of

(A) from 0.7 to 1.3 molar parts of one or more N-methacrylamides [sic] $C_4H_6NOR^1$ according to Figure 6, where R^1 is as described above,

5 from 0.7 to 1.3 molar parts of methacrylic anhydride,

from 0.7 to 1.3 molar parts of methacrylonitrile;

10 (B) from 0.3 to 2.0 molar parts of methacrylonitrile,

from 0.7 to 2.5 molar parts of methacrylic acid and

15 from 0 to 0.2 molar part of other monomers having vinyl unsaturation, where the ratio of the total of the molar parts of (B) and (A) is $(B)/(A) =$ from 0 to 1 million;

(C) from 0.5 to 15 per cent by weight, based on the total of the weights of components (A) and (B), of a blowing agent;

20 (D) from 0.01 to 0.5 per cent by weight, based on the total of the weights of components (A) and (B), of one or more polymerization initiators;

25 (E) from 0 to 200 per cent by weight, based on the total of the weights of components (A) and (B), of conventional additives

is polymerized to give a sheet, and then this polymer sheet is foamed at temperatures of from 150 to 250°C.

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7. Process for producing a polymethacrylimide foam, characterized in that a mixture composed of

(A) from 0 to 2.6 molar parts of one or more primary amines H_2NR^1 , where R^1 is as described above,

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from 0 to 5.2 molar parts of one or more N-methacrylamides [sic] $C_4H_6NOR^1$ according to Figure 6, where R^1 is as described above,

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from >0 to 6.5 molar parts of methacrylic anhydride,

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from 0 to 3.9 molar parts of methacrylonitrile and

from 0 to 1.3 molar parts of methacrylic acid;

(B) from 0.3 to 2.0 molar parts of methacrylonitrile,

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from 0.7 to 2.5 molar parts of methacrylic acid and

from 0 to 0.2 molar part of other monomers having vinyl unsaturation, where the ratio of the total of the molar parts of (B) and (A) is $(B)/(A) =$ from 0 to 1 million;

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(C) from 0.5 to 15 per cent by weight, based on the total of the weights of components (A) and (B), of a blowing agent;

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(D) from 0.01 to 0.5 per cent by weight, based on the total of the weights of components (A) and (B), of one or more polymerization initiators;

(E) from 0 to 200 per cent by weight, based on the total of the weights of components (A) and (B), of conventional additives

is polymerized to give a sheet, and then this polymer sheet is foamed at temperatures of from 150 to 250°C.

- 5 8. Process according to any of Claims 3 to 7, characterized in that the blowing agent used comprises an aliphatic alcohol having from 3 to 8 carbon atoms, urea, monomethyl- and/or N,N'-dimethylurea and/or formamide and/or water.
- 10 9. Laminate comprising a layer of a poly(meth)acrylimide foam according to any of Claims 1 to 8.
- 15 10. Automobile characterized in that it is composed entirely or partially of a poly(meth)acrylimide foam according to at least one of the preceding claims.
- 20 11. Rail vehicle characterized in that it is composed entirely or partially of a poly(meth)acrylimide foam according to at least one of the preceding claims.
- 25 12. Watercraft characterized in that it is composed entirely or partially of a poly(meth)acrylimide foam according to at least one of the preceding claims.
- 30 13. Rotor characterized in that it is composed entirely or partially of a poly(meth)acrylimide foam according to at least one of the preceding claims.